Safer Chemicals Healthy Families

Toxic Vaping

Industry slow to end use of toxic chemical cleaner TCE for vapor degreasing, while US EPA delays action on its proposed ban

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Safer Chemicals, Healthy Families (*SaferChemicals.org*) is a project of Kitchen Table Campaigns, a 501(c)(3) nonprofit organization. This project is a coalition of national, state, and local organizations committed to assuring the safety of chemicals used in our homes, workplaces and in everyday products. Safer Chemicals, Healthy Families played a leadership role in the reform of the federal Toxic Substances Control Act (TSCA), which Congress significantly strengthened in 2016.

EXECUTIVE SUMMARY

Although some industrial firms are phasing out their use of the toxic cleaning chemical trichloroethylene (TCE) for vapor degreasing, the vast majority appear to be holding back to "wait and see" if the U.S. Environmental Protection Agency (EPA) ever adopts its proposed ban on that use of TCE. This conclusion is based on a survey of 143 industrial facilities that reported air emissions of TCE within the United States.

Safer Chemicals, Healthy Families graded the industrial facilities based on their responses:

- 17 industrial plants earned a grade of A, B, or C for planning to replace TCE with a safer alternative, replacing or planning to replace TCE with an undisclosed alternative, or continuing to search for a safer alternative;
- 16 facilities were awarded a D grade for failing to search for safer alternatives or for switching to a "regrettable substitute" that poses other known hazards;
- Another 34 industrial sites were slapped with an F for failure to respond to stakeholder queries, despite repeated attempts; and
- The rest (76 facilities) were not graded because they didn't use TCE for vapor degreasing.[1]

Vapor degreasing is a process used in commercial settings to clean equipment or other items with hot vapor. TCE is heated, condenses onto parts placed in the degreasing unit, and carries contaminants away from those parts as it drips off.

According to EPA, between 45,000 and 107,000 workers, including 454 to 1,066 pregnant women, are at risk for serious adverse health effects from exposure to TCE used in vapor degreasing processes where they work or nearby. TCE poses serious health dangers, including fetal heart defects and cancer.[2]

In January 2017, because of these health risks and the potential for exposure, EPA proposed a finding that using TCE for commercial vapor degreasing "presents an unreasonable risk to human health" under the newly revised Toxic Substances Control

Act and formally proposed a rule to ban this use. EPA has not yet adopted a final rule to implement this pending ban.

Based on the findings of this Report, a wholesale shift toward safer alternatives is not likely unless EPA swiftly finalizes a health-protective rule to ban TCE's use in vapor degreasing. Every moment EPA delays its rule, workers are at an increased risk for serious health impacts from TCE exposure.

Safer Chemicals, Healthy Families (SCHF) launched its investigation in March 2017 to assess industry progress in replacing TCE with safer alternatives for use in vapor degreasing. We reached out to 143 facilities that may currently use TCE for vapor degreasing to confirm this use. We then asked about their plans to phase it out or about barriers preventing a phase-out. Several respondents described the ineffectiveness and/or high cost of alternatives as obstacles. Some claimed their workers' exposure to TCE is limited.

We urge industry to move more quickly to find and implement safer alternatives and urge EPA to stop delaying and finalize its proposed vapor degreasing rule with a renewed focus on safer alternatives.

I. INTRODUCTION

Safer Chemicals, Healthy Families (SCHF) initiated the investigation described in this report to determine which U.S. facilities are currently using the chemical solvent trichloroethylene (TCE) in vapor degreasing. Our goal was to urge them to promptly phase out this use in favor of safer alternatives because of the serious health risks described below.

TCE is a chemical solvent mainly used in industrial and commercial processes, including vapor degreasing. Vapor degreasing is a cleaning process for fabricated parts that involves heating solvents like TCE in a degreasing unit to a hot vapor.[3] The vapor condenses onto parts placed in the unit, and carries contaminants away from those parts as it beads and then drips off.[4] The two types of degreasing units are "batch" and "in-line."[5] In a batch machine, each load of parts is degreased one group at a time.[6] With in-line systems, by contrast, "parts are continuously loaded into and through the vapor degreasing equipment."[7]

On January 19, 2017, the U.S. Environmental Protection Agency (EPA) proposed a determination that using TCE for commercial vapor degreasing "presents an unreasonable risk to human health."[8] EPA proposed a ban under the Toxic Substances Control Act (TSCA) on the commercial use of TCE in vapor degreasing and on TCE's "manufacture (including import), processing, and distribution in commerce" for vapor degreasing in line with this finding.[9]

EPA based its determination on the Agency's 2014 risk assessment where it found serious health risks associated with TCE's use in vapor degreasing.[10] The box below details these risks as well as the number and type of people EPA determined most likely to be exposed to these risks.[11]

EPA'S ASSESSMENT OF TRICHLOROETHYLENE'S POTENTIAL IMPACTS ON HUMAN HEALTH			
Exposure	**Health Hazard**	**At-Risk Groups**	**Exposure Potential**
Short-Term (Acute)	Developmental effects (fetal cardiac defects)	Workers - including pregnant women and women of reproductive age	Approx. **45,390 to 106,590** workers (**including 454 to 1,066** pregnant women) using vapor degreasers or working nearby are exposed to TCE
Long-Term (Chronic)	Cancer (kidney, liver, Non-Hodgkin lymphoma) Developmental effects Non-cancer kidney effects Immunotoxicity Reproductive effects Neurotoxicity Non-cancer liver effects		

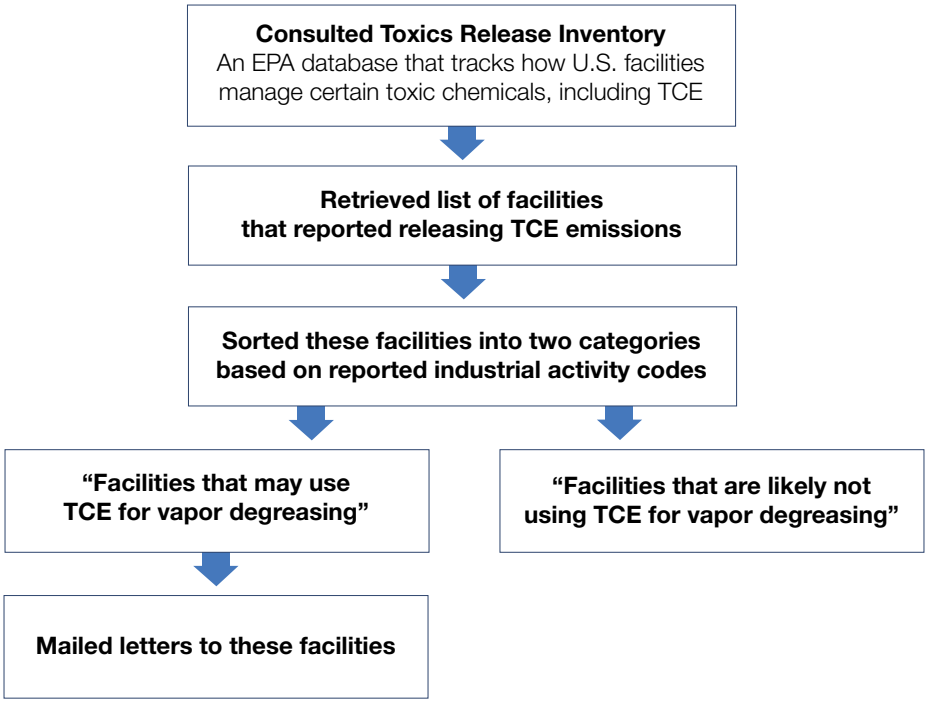
The agency estimates that the highest exposures are associated with in-line conveyorized systems and the lowest for batch closed-loop systems that are airtight, airless (air is removed during the process), or airless vacuum to vacuum (where the degreasing is done entirely in a vacuum). For all exposure situations, EPA proposed to determine "that acute [and chronic] TCE exposures from vapor degreasing present unreasonable risks."[12]

In its proposed rule, EPA listed several alternatives to using TCE in vapor degreasing, such as aqueous cleaning systems and other cleaning solvents such as soy-based products. Unfortunately, the agency also discussed drop-in solvent alternatives that are clear "regrettable substitutes" such as methylene chloride, 1-bromopropane (1-BP or n-propyl bromide), and perchloroethylene, despite the known toxicity of these chemicals.[13]

II. METHODOLOGY

Safer Chemicals, Healthy Families sought to determine which facilities in the U.S. currently use TCE in vapor degreasing processes, and to urge them to move quickly to safer alternatives.

The following diagram provides an overview of how we determined which facilities to contact:



The Toxics Release Inventory (TRI) Explorer is a section on EPA's website that allows the public to generate reports on facilities that release specific chemicals.[14] Using the Explorer, we identified all facilities that reported releasing TCE to air, land, and water in 2015. We reviewed the 2015 data because it was the most recent year for which completed data was available when we initiated our research.[15] We narrowed the list of facilities to include only those reporting air emissions greater than zero pounds in 2015.[16]

In May 2017, we sent letters to the 143 facilities that may use TCE for vapor degreasing, because their North American Industry Classification System (NAICS) code(s) matched at least one in EPA's proposed rule.[17] (See Appendix I for a sample letter.) The mailing alerted them to the health hazards faced by workers when conducting vapor degreasing with TCE, described the intent of and basis for EPA's proposed rule, and requested a response to the following questions:

1. Does your facility currently use TCE in degreasing processes?
2. If so, when do you plan to phase out this use of TCE?
3. If no end date is specified, what are the barriers to phasing out this use of TCE?

This report summarizes the responses we received and/or the public information independently provided to EPA by the facilities, shows which facilities declined to respond despite our multiple attempts to reach them, and highlights those that reported increases in TCE emissions from 2015 to 2016.

We graded facilities according to Table 1 below, based on their commitment to ending use of TCE in vapor degreasing and their transparency in reporting their efforts to do so. Facilities awarded an "A" have shown the highest level of commitment to finding and implementing safer alternatives, whereas a "B" was awarded to facilities that plan to move to or have already implemented an alternative, but did not confirm whether their alternative is safer. Facilities given a "C" are making an effort to search for safer alternatives, but have no immediate plans to switch. A "D" was given to facilities that are not actively seeking to move away from the chemical, or have already implemented a "regrettable substitute" - one posing other known hazards. An "F" was awarded to those facilities that did not respond to repeated inquiries or submit relevant public information in comments on EPA's proposed vapor degreasing rule or on TRI forms. We did not grade facilities that told us they do not use TCE for vapor degreasing, those that are waste processors, chemical manufacturers or distributors, or adhesives manufacturers, or those that only reported 2016 emissions.[18]

Table 1: Criteria for grades

A	Plans to phase out TCE in vapor degreasing and move to a safer alternative
B	Plans to phase out (or already phased out) TCE in vapor degreasing and toxicity of alternative is unclear
C	Searching for safer substitutes to TCE in vapor degreasing
D	Not actively searching for substitutes for this usage of TCE or has already moved to a “regrettable substitute”
F	Did not respond to repeated stakeholder queries
No Grade	TCE used for purposes other than vapor degreasing / only reported TCE emissions for 2016

III. RESPONSES BY FACILITIES

33 out of the 143 facilities that we contacted confirmed their current or past use of TCE for vapor degreasing. These facilities either responded to our inquiry or made public statements in comments on EPA's proposed vapor degreasing rule or in notes on 2015 or 2016 TRI forms reporting TCE emissions.[19]

Table 2A names these facilities and groups them by grade. Table 2B highlights the facilities that did not respond or provide relevant public information to EPA. *Appendix II* provides the full list of 143 facilities and the grade for each, and also names facilities that only reported 2016 emissions.[20]

Table 2A: Grading progress in replacing TCE in vapor degreasing with safer alternatives

A: One (1) facility plans to phase out this use and move to a safer alternative
Roper Pump Co (Commerce, GA)
B: Four (4) facilities plan to phase out this use or have phased it out but toxicity of alternative is unknown
Blue Cube Operations LLC - Plaquemine Site (Plaquemine, LA)
Masters Machine Co (Round Pond, ME)
Olin Blue Cube Freeport TX (Freeport, TX)
Wauconda Tool & Engineering Co Inc (Algonquin, IL)
C: Twelve (12) facilities are searching for substitutes to TCE in vapor degreasing
3P Processing Inc (Wichita, KS)
Accurate Forming LLC (Hamburg, NJ)*
Advanced Heat Treat Corp (Monroe, MI)
Advanced Heat Treat Corp (Waterloo, IA)
Chem Processing Inc (Rockford, IL)
Fountain Plating Co Inc (West Springfield, MA)
Greatbatch – Globe Tool Inc (Integer) (Minneapolis, MN)**[21]
Lake Region Medical (Integer) (Trappe, PA)** [22]
McMillan Electric Co (Woodville, WI)
Rochester Steel Treating Works Inc (Rochester, NY)
Salem Tube Inc (Greenville, PA)
The Boeing Co (Berkeley, MO)*[23]

D: Sixteen (16) facilities are not actively searching for substitutes or have already moved to a regrettable substitute

Alloyweld Inspection Co (Bensenville, IL)***[24]

AMETEK Specialty Metal Products Div (Wallingford, CT)

Anoplate Corp (Syracuse, NY)

Diamond Chrome Plating Inc (Howell, MI)

Dutton-Lainson Co (Hastings, NE)*

EaglePicher Technologies LLC (Joplin, MO)*

FJC Services LLC (Terryville, CT)*

GKN Aerospace NA Inc (Hazelwood, MO)

Head Manufacturing Inc (South Elgin, IL)

Limco-Airepair Inc (Tulsa, OK)

LS Starrett Co (Athol, MA)

Microporous LLC (Piney Flats, TN)

Mullins Rubber Products Inc (Riverside, OH)

Steel Coatings Inc (Salt Lake City, UT)[25]

Summerill Tube Corp (Scottdale, PA)***[26]

US Ringbinder (St. Louis, MO)

*Facility did not directly respond to our inquiry - we used information from its TRI forms or public comments to EPA.

**The parent company of this facility only confirmed use of TCE for vapor degreasing; we gathered additional details from public comments to EPA.

***Statement on TRI form conflicted with statements made directly to us before or on the same day the TRI form was certified, so we assigned a grade based on the TRI form.

Table 2B: Facilities receiving an F for failure to respond

F: Thirty-four (34) facilities did not respond or provide relevant public information to EPA	
Able Electropolishing Co Inc (Chicago, IL)	Larsen's Manufacturing Co (Fridley, MN)
Advanced Forming Technology (Longmont, CO)	Lytron Inc (Woburn, MA)
Akebono - Elizabethtown Plant (Elizabethtown, KY)	Marquette Tool & Die Co (St Louis, MO)
Betty Machine Co Inc (Hendersonville, TN)	MJ Celco Inc (Schiller Park, IL)
Cessna Aircraft Co, Pawnee Facility (Wichita, KS)	MN Twist Drill Aquisition LLC (Chisholm, MN)
Daramic LLC (Corydon, IN)	MPC Plating Inc (Cleveland, OH)
Dynex/Rivett Inc (Pewaukee, WI)	National Copper & Smelting Co (Huntsville, AL)
Energizer Manufacturing Inc (Bennington, VT)	NORDAM I&S Div (Tulsa, OK)
Fischer Special Manufacturing Co (Cold Spring, KY)	Plymouth Tube Co (Salisbury, MD)
FN America LLC (Columbia, SC)	R E Darling Co Inc (Tucson, AZ)
Gasser & Sons Inc (Commack, NY)	Romatic Manufacturing Co Inc (Southbury, CT)
Globe Engineering Co Inc (Wichita, KS)	Spirit AeroSystems Inc (Wichita, KS)
HandyTube Corp (Camden, DE)	Tech Tube (King of Prussia, PA)
Honeywell Aerospace - Minneapolis (Minneapolis, MN)	Travis Pattern & Foundry Inc (Spokane, WA)
Hu-Friedy Mfg Co LLC (Chicago, IL)	TWR Service Corp (Schaumburg, IL)
KAGA (USA) Inc (Santa Ana, CA)	United Launch Alliance - Decatur Operations (Trinity, AL)
Kastalon Inc (Alsip, IL)	Viking Drill & Tool Inc (St Paul, MN)

IV. ANALYSIS OF FACILITY RESPONSES

A. Several facilities are leading the way by phasing out TCE in vapor degreasing without waiting for final EPA action

Seven facilities have phased out their use of TCE for vapor degreasing or committed to phasing it out soon, likely over the next year.[27]

However, only one of these confirmed it was moving to a safer alternative:

- *Roper Pump Co* is working toward ending its use of TCE for vapor degreasing at its Commerce, GA plant; they are hopeful this will happen in the next year. Staff at Roper Pump told us that the company decided to make this change after the successful implementation of an aqueous degreaser at its Houston plant that makes a very similar product.[28]

Four other facilities did not comment on whether they are or would be using a safer process:

- *Blue Cube Operations LLC - Plaquemine Site* used TCE for vapor degreasing years ago, but this usage has since been phased out, according to a representative of the facility. The representative did not confirm the chemical or process that they currently use.[29]
- *Masters Machine Co (Round Pond, ME)*, according to staff, plans to completely phase out the use of TCE for vapor degreasing by the end of 2017. On the 2016 TRI form, the facility stated that it bought a vacuum vapor degreasing system to "totally eliminate the use of Trichloroethylene as a solvent."[30] Staff declined to confirm which solvent the facility had instituted as a replacement.[31]
- *Olin Blue Cube Freeport TX*, according to a representative of the facility, used TCE for vapor degreasing at some point, but said the facility does not currently have any TCE so we inferred that it has phased out this usage.[32] The representative did not provide any information on the replacement for TCE.
- *Wauconda Tool & Engineering Co Inc (Algonquin, IL)*, according to staff of its parent company NN, Inc., is exploring the purchase of new equipment and obtaining EPA certification to move to a new vapor degreasing process. This facility expects

to complete the transition in the next 12 months, but did not confirm whether their new process would be safer.[33]

Two additional facilities stated they moved to a toxic alternative, n-propyl bromide:

- *Alloyweld Inspection Co (Bensenville, IL)*, according to its 2016 TRI form, "changed from trichloroethylene to n-proply [*sic*] bromide."[34]
- *EaglePicher Technologies LLC (Joplin, MO)* stated on its 2016 TRI form that the facility had "[e]liminated trichloroethylene and changed to n-Propyl Bromide Precision Cleaning Solvent, a non-flammable Azeotropic Solvent Mixture…for degreasing purposes."[35]

B. Others provided no indication of moving imminently to a safer alternative

The other 26 facilities that responded to our survey or publicly disclosed information to EPA confirming their use of TCE for vapor degreasing are not taking steps to immediately transition to safer alternatives for vapor degreasing. In addition, 34 facilities didn't respond to us or provide relevant information to EPA in public comments on the proposed vapor degreasing rule or in usage notes on TRI forms by the date of publication.[36]

C. Too many facilities cite challenges in transitioning to safer alternatives and have no specific plans to phase out TCE in vapor degreasing

Sixteen of the twenty-six facilities, on their own or through their parent companies, pointed to barriers that have kept them from moving to alternative methods of vapor degreasing. Some facilities treated these barriers as insurmountable, while others are still actively seeking alternatives, as indicated in Table 2A (receiving grades of D and C, respectively).

1. Technical challenges

Representatives from six facilities and two parent companies speaking for three facilities indicated that alternatives presented technical challenges. Two (Head Manufacturing Inc and US Ringbinder) specifically stated that water, such as that in aqueous degreasers, caused discoloration of brass or rusting of raw steel; brass and steel are the primary materials used by these facilities.[37] One (Head Manufacturing Inc) said using detergent left a residue that allowed the parts to be tightened too much and caused snapping.[38] An employee at an industrial battery separators manufacturing facility (Microporous LLC) asserted there was no other alternative technology for the industry and that more hazardous chemicals would corrode the metal.[39]

Integer submitted detailed comments on EPA's proposed rule describing its concerns with a requirement to move away from TCE for vapor degreasing. This company is the parent of two facilities that reported releasing TCE in the TRI: Greatbatch – Globe Tool, Inc (Minneapolis, MN) and Lake Region Medical (Trappe, PA). In its comments, Integer said "[o]ver the years, Integer has continued to evaluate alternative non-HAP solvents," and that it has switched to TCE-free degreasing operations where feasible and effective.[40] However, Integer maintained that this has not been possible for all of its products, such as long precision tubing and coils and other items with medical applications.[41] The company's filing detailed its exploration of the different alternatives suggested by EPA in the proposed rule. According to the company, some of the products manufactured by Integer cannot be degreased through aqueous degreasing, and the company believes "there are no known drop-in non-regulated solvents effective for cleaning all of [its] medical device applications."[42]

The Boeing Company "is the world's largest manufacturer of commercial jetliners and defense, space, and security systems."[43] According to its comments to EPA on the proposed rule, Boeing has replaced vapor degreasing with aqueous degreasing for most "detail parts" and the company "continue[s] to invest in developing alternative solutions," but cites "technical challenges" as the reason for continuing to use TCE to clean other parts.[44]

In its comments, Boeing described an oxygen tube for a military pilot onboard oxygen generating system as one example of a part presenting technical challenges. The company asserted that this part must be cleaned extremely thoroughly so that it can be

operated in a high-oxygen system.[45] Boeing also described how another type of part, a honeycomb core, "is an essential component of many critical aerospace parts/assemblies due to its weight, strength and stiffness."[46] If this part doesn't meet cleanliness requirements or if it entraps liquids, which is possible from aqueous degreasing, Boeing maintained that "structure durability" could be seriously impacted.[47] According to the company, in some cases, facilities supply honeycomb core parts to Boeing that "may be degreased by specifications based on [Department of Defense] and [Federal Aviation Administration] requirements using TCE."[48]

2. Increased costs

One facility (Rochester Steel Treating Works Inc) stated that the alternatives are much more expensive and switching could effectively require shutting down an entire department.[49] Another (LS Starrett Co) said the costs of alternatives were "outrageous" – triple to quadruple what they currently pay.[50] One believed a closed-loop machine would be too costly.[51] A few others mentioned cost in general as a barrier.

In its comments, Integer discussed cost-related challenges in addition to technical barriers in moving to alternate processes. According to the company, it would be difficult and costly to degrease certain parts with alternative processes even if they would be effective.[52] Since Integer is contractually required to not alter certain medical device manufacturing processes, the company stated it would have to notify its customers if it found an effective replacement.[53] Integer believes that its customers could face significant costs to re-validate the new process, or just end up asking for a cheaper price or moving to a new supplier.[54] The company indicates equipment like an airless vacuum degreaser may end up being its most effective option, but Integer estimates this would likely be very costly to implement.[55]

3. Increased toxicity of alternatives

Staff at Rochester Steel Treating Works Inc noted difficulties in obtaining air permits for some replacement chemicals. The company retains an environmental consultant to review safety data sheets for replacement chemicals. According to staff reports, this consultant has weeded out hazardous replacements such as n-propyl bromide.[56]

Unfortunately, as indicated above, EaglePicher Technologies LLC did not share this concern and replaced TCE with "n-Propyl Bromide Precision Cleaning Solvent, a non-flammable Azeotropic Solvent Mixture" in degreasing.[57] Alloyweld Inspection Co has also moved to n-propyl bromide, according to its 2016 TRI form.[58]

4. Contracts requiring the use of TCE

Three facilities stated they are required by contracts with The Boeing Company and other major businesses to use TCE for vapor degreasing, and cite this as a barrier to switching.[59] An employee of an additional facility (3P Processing Inc) said that their company had contracts with 18 different "original equipment manufacturers" that would not all agree on one suitable substitute for TCE.[60]

5. Claimed low level of exposure to TCE

According to EPA, and as discussed above, health risks may still exist with even limited worker exposure.[61]

Four facilities claimed their workers' exposure to TCE is limited or generally asserted low emissions because of special equipment or precautions and had no plans to phase out their remaining use of TCE. AMETEK Specialty Metal Products Div employs a continuous web cleaning system for vapor degreasing, and the company believes worker exposure to TCE is significantly reduced compared with a typical batch cleaning unit where the worker would be operating right over it.[62] An Anoplate Corp employee stated that in 2017, their company "installed a near-zero emission degreaser manufactured by SEREC."[63] A Microporous LLC employee claimed that workers are not exposed to any solvents in industrial battery separators manufacturing.[64] Staff at Steel Coatings Inc stated they take sufficient precautions and indicated they did not feel pressed to search for alternatives.[65]

D. Forty (40) facilities reported increased emissions in 2016

EPA released the first version of the 2016 TRI preliminary dataset on July 19, 2017 and issued the complete 2016 dataset with forms processed as of October 9, 2017.[66] As stated in the methodology, we surveyed facilities based on their 2015 TCE air emissions because that was the most complete data available at the time we initiated our research.

Since the preliminary 2016 TRI data was not posted until most of our research was completed, we did not grade those facilities according to the 2016 data.

While changes from 2015 to 2016 were not appreciable, we noted the following:

1. Ten facilities that did not report emissions in 2015 reported emissions for 2016; these are included in *Appendix II*.[67]

   The largest new emitter in 2016, Electro Chemical Engineering & Manufacturing, released a total of 17,471 pounds of TCE into the air.[68] Staff did not respond to our inquiry as to whether this facility uses TCE for vapor degreasing. Because they were not part of our initial research and therefore were not surveyed, we have not assigned a grade to this facility or to others that reported emissions in 2016 but not 2015.

2. 40 of the 67 facilities that are known or presumed to use TCE in vapor degreasing (or had reported phasing out the usage) reported higher emissions of the chemical in 2016 relative to 2015, based on the complete 2016 TRI dataset released in October. 30 of these facilities reported 2016 emissions that were at least 10% or 10 pounds greater than 2015 emissions, and are listed in Table 3.

Salem Tube Inc, whose staff told us the facility was searching for alternatives, nonetheless reported major increases in TCE emissions (80%). Facilities such as Able Electropolishing Co Inc and Daramic LLC, which didn't respond to us, were already emitting a (very) high volume of TCE and showed substantial increases of almost 200% and over 50%. FJC Services LLC stated on its 2016 TRI form that it went from running two large vapor degreasers for most of 2015 to three large machines and one small one for most of 2016.[69] This is reflected in the facility's increase of 30%.

Representatives for two facilities, Blue Cube Operations LLC - Plaquemine Site and Olin Blue Cube Freeport TX, reported that the facilities had stopped using TCE for vapor degreasing (one of these had phased it out several years ago). Surprisingly, these facilities reported increases in TCE emissions from 2015 to 2016 of 28% and 26%. The staff did not indicate what TCE is used for instead.[70] In addition, the representative for

Olin Blue Cube Freeport TX said the plant had no TCE, despite the emissions reported on the 2016 TRI form.

These large increases in emissions mean that workers at these facilities may be at an even higher risk of health problems from TCE exposure in 2016.

Table 3: Increases in reported TCE air emissions from 2015 to 2016[71]

Grade	Facility Name	City, State	Total air emissions (pounds)		Percent change
			2015	2016	
F	**Able Electropolishing Co Inc***	Chicago, IL	9,877	29,114	195%
D	**LS Starrett Co**	Athol, MA	2,689	7,264	170%
D	**Limco-Airepair Inc**	Tulsa, OK	363	913	151%
C	**Salem Tube Inc**	Greenville, PA	15,960	28,787	80%
F	**Romatic Manufacturing Co Inc***	Southbury, CT	9,581	14,678	53%
F	**Daramic LLC***	Corydon, IN	384,707	587,624	53%
F	**Travis Pattern & Foundry Inc***	Spokane, WA	2,305	3,355	46%
F	**Marquette Tool & Die Co***	St Louis, MO	5,280	7,660	45%
D	**Mullins Rubber Products Inc**	Riverside, OH	6,920	9,710	40%
F	**Gasser & Sons Inc***	Commack, NY	8,500	11,807	39%

Grade	Facility Name	City, State	Total air emissions (pounds)		Percent change
			2015	2016	
D	**AMETEK Specialty Metal Products Div**	Wallingford, CT	18,067	24,380	35%
D	**Alloyweld Inspection Co**	Bensenville, IL	10,990	14,675	34%
F	**FN America LLC***	Columbia, SC	6,175	8,125	32%
D	**FJC Services LLC**	Terryville, CT	15,125	19,680	30%
F	**Honeywell Aerospace - Minneapolis***	Minneapolis, MN	4,209	5,397	28%
B	**Blue Cube Operations LLC - Plaquemine Site**	Plaquemine, LA	64	82	28%
B	**Olin Blue Cube Freeport TX**	Freeport, TX	1,340	1,689	26%
F	**Kastalon Inc***	Alsip, IL	5,280	6,600	25%
F	**Larsen's Manufacturing Co***	Fridley, MN	14,798	18,371	24%
F	**Spirit AeroSystems Inc***	Wichita, KS	47,491	58,732	24%
C	**Advanced Heat Treat Corp**	Monroe, MI	11,440	14,144	24%
F	**Plymouth Tube Co***	Salisbury, MD	59,667	73,686	23%
C	**Rochester Steel Treating Works Inc**	Rochester, NY	8,397	10,047	20%
D	**Dutton-Lainson Co**	Hastings, NE	22,602	26,815	19%
F	**Betty Machine Co Inc***	Hendersonville, TN	23,841	28,180	18%

Grade	Facility Name	City, State	Total air emissions (pounds)		Percent change
			2015	2016	
D	**Microporous LLC**	Piney Flats, TN	117,356	137,249	17%
F	**Hu-Friedy Mfg Co LLC***	Chicago, IL	9,160	10,379	13%
D	**EaglePicher Technologies LLC**	Joplin, MO	2,032	2,284	12%
F	**TWR Service Corp***	Schaumburg, IL	6,654	7,471	12%
F	**Lytron Inc***	Woburn, MA	9,560	10,627	11%

* Facility did not respond to repeated stakeholder inquiries, so may not use TCE for vapor degreasing

E. Many in industry are disregarding valid stakeholder concerns

After mailing letters and following up with numerous phone calls and/or emails over several weeks, we did not receive responses (or find relevant public information provided to EPA) from 34 (24%) of the 143 facilities that we contacted.[72] If all or most of these facilities use TCE in vapor degreasing, even more plants may be putting the health of their workers at risk.

V. CONCLUSION

Industry is not moving quickly enough to eliminate a serious risk to human health by assessing and switching to safer alternatives to TCE. While a handful of facilities have committed to phasing out TCE or have already done so, most of these did not confirm they moved to or plan to move to a safer alternative. Moreover, the vast majority of the facilities that responded to our survey have no immediate plans to move to safer alternatives. The hazards workers may face in TCE degreasing operations have been studied by EPA, are considered serious enough to propose a ban, and should be addressed accordingly.

Recommendations:

EPA – Finalize the proposed vapor degreasing rule without further delay. Our findings show that facilities using TCE for vapor degreasing are slowly moving to safer alternatives, if at all. The longer EPA delays in finalizing its rule, the longer workers are exposed to this dangerous chemical.

Industry – Seek out and begin using safer alternatives to TCE, without waiting for EPA to finalize its rule.

Facilities must prioritize the health of their workers and protect them from TCE exposure by eliminating the use of this solvent for vapor degreasing and moving to safer substitutes. It is not acceptable to substitute hazardous solvents like n-propyl bromide or methylene chloride. Facilities with contracts requiring them to use TCE in vapor degreasing should seek to renegotiate these contracts. Even where facilities believe their workers are only minimally exposed to TCE because of special equipment or precautions, the facilities should still move to safer alternatives that have zero TCE exposure.

The public – Call on EPA to finalize the proposed ban on commercial vapor degreasing and ask companies to be a better neighbor and safer employer.

TCE exposure puts workers' health at risk. *Appendix III* shows the 2015 TCE air emissions as well as the city, state, zip code and contact information of the facilities that confirmed their current or past use of TCE for vapor degreasing (aside from the facility that told us they were moving to a safer alternative). The public should reach out to nearby facilities to express concerns about continued usage of TCE.

APPENDIX I –

Letter from Safer Chemicals, Healthy Families

May 17, 2017

[redacted]
Facility: [redacted]

Re: **U.S. EPA says that Use of TCE for Vapor Degreasing Poses a Risk to Human Health**

Dear [redacted]:

We are writing to alert you that the U.S. Environmental Protection Agency (EPA) has proposed to make a determination that the commercial use of the chemical solvent trichloroethylene (TCE) for vapor degreasing "presents an unreasonable risk to human health." Your company may have been using TCE for that same purpose.

We are concerned because EPA's risk assessment identified multiple health risks from TCE exposure for workers operating vapor degreasers and for other workers nearby. Therefore, we respectfully request that you respond to the following questions by June 5, 2017:

1. Does your facility currently use TCE in degreasing processes?

2. If so, when do you plan to phase out this use of TCE?

3. If no end date is specified, what are the barriers to phasing out this use of TCE?

Safer Chemicals, Healthy Families (SCHF) is a coalition of national, state, and local organizations committed to assuring the safety of chemicals used in our homes, workplaces and in everyday products. We played a leadership role in the reform of the federal Toxic Substances Control Act (TSCA), which Congress significantly strengthened in 2016.

On January 19, 2017, EPA proposed to make a formal finding of "unreasonable risk" and to prohibit the commercial use of TCE in vapor degreasing and its "manufacture (including import), processing, and distribution in commerce" for vapor degreasing use, under TSCA.[1] In EPA's risk assessment, the agency found significant health risks associated with TCE's use in vapor degreasing, including liver and kidney cancer and non-Hodgkin's lymphoma from chronic exposure and a range of other effects resulting from developmental toxicity (e.g. cardiac birth defects), immunotoxicity, and neurotoxicity. The attached fact sheet summarizes the concerns with TCE used for vapor degreasing, based on the extensive analyses in the cited EPA risk assessment and proposed rule.

[1] 82 Fed. Reg. 7432-3, Trichloroethylene (TCE); Regulation of Use in Vapor Degreasing Under TSCA Section 6(a), (January 19, 2017). See https://www.regulations.gov/document?D=EPA-HQ-OPPT-2016-0387-0001

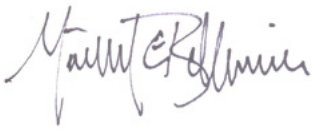
You reported air emissions of TCE in 2015 from the facility to which this letter is addressed, according to the most recent TRI Form R data available on EPA's Envirofacts website.[2] You also reported a North American Industrial Classification System (NAICS) code that matched a list of industries that potentially use TCE for vapor degreasing, according to EPA's proposed rule.[3]

If your facility is currently using TCE for vapor degreasing, we urge you to discontinue this practice. EPA's proposed determination of unreasonable risk to human health is based on sound science. We strongly encourage your company to be proactive in protecting the health of all people who may be exposed to TCE from your operations.

Please provide your response to our questions by June 5, 2017 to Jennifer Dickman, Program Associate at Safer Chemicals, Healthy Families, who's reachable at jdickman@saferchemicals.org or (202) 794-8757.

Thank you for your consideration. We appreciate your cooperation and would welcome the opportunity to discuss this matter further.

Sincerely,



Andy Igrejas, Executive Director
Safer Chemicals, Healthy Families

Mike Belliveau, Senior Advisor
Safer Chemicals, Healthy Families

Enclosure: Fact sheet on Trichloroethylene

cc: TRI Certifying Official, [redacted]

[2] U.S. Environmental Protection Agency, TRI Search, available at https://www.epa.gov/enviro/tri-search
[3] 82 FR 7433, Proposed vapor degreasing rule

FACT SHEET

Chemical Name:	**Trichloroethylene (TCE)**
CAS Registry Number:	79-01-6
Summary:	TCE is a widely used degreasing solvent. Women of reproductive age or pregnant women who work right in or near these operations may be exposed and are vulnerable to developmental toxicity. Workers may be at risk of developing cancer or other health issues.
National Production:	172 million pounds (in 2015, equals domestic manufacturing + imports)
Relevant Use Presenting a Risk of Concern to EPA:	**Vapor Degreasing** (See below for other uses)

POTENTIAL IMPACTS ON HUMAN HEALTH

Exposure:	Health Hazard:	At-Risk Groups Potentially Affected:	Impact:
Short-Term (Acute)	Developmental effects (fetal cardiac defects)	**Workers, including pregnant women and women of reproductive age**	About 30,000 workers using vapor degreasers or working nearby are exposed to TCE
Long-Term (Chronic)	Cancer, Developmental effects, Kidney effects, Immunotoxicity, Reproductive effects, Neurotoxicity, and Liver effects		
Alternatives:	• Aqueous cleaning systems • Other cleaning solvents, such as soy-based cleaners		
Other Uses:	Aerosol spray degreasers, spotting agents at dry cleaning facilities, spray-applied protective coatings for arts and crafts, chemical intermediates in refrigerant manufacturing, film cleaners, toner aides, and mirror edge sealants		
Manufacturers (Site Location): (U.S., in 2015)	Geon Oxy Vinyl LaPorte Plant (Laporte, TX); Olin Corporation (Freeport, TX); and Solvchem, Inc. (Pearland, TX). Occidental Chemical Corporation (Wichita, KS) and Univar Inc. (Redmond, WA) may manufacture TCE, but this information is claimed Confidential Business Information.		
Sources:	U.S. Environmental Protection Agency, TSCA Work Plan Chemical Risk Assessment, Trichloroethylene: Degreasing, Spot Cleaning and Arts & Crafts Uses, CASRN: 79-01-6, EPA Document # 740-R1-4002, June 2014, https://www.epa.gov/sites/production/files/2014-11/documents/tce_opptworkplanchemra_final_062414.pdf Trichloroethylene (TCE); Regulation of Use in Vapor Degreasing Under TSCA Section 6(a), 82 Fed. Reg. 7449 (January 19, 2017).		

Endnotes

[1] We did not grade these facilities because they confirmed they did not use TCE for vapor degreasing or because their line of business - waste processing, chemical manufacturing or distributing, or adhesives manufacturing- makes it unlikely that they use TCE for vapor degreasing.

[2] Trichloroethylene (TCE); Regulation of Use in Vapor Degreasing Under TSCA Section 6(a), 82 Fed. Reg. 7433-4, (proposed January 19, 2017), *https://www.regulations.gov/document?D=EPA-HQ-OPPT-2016-0387-0001*

[3] U.S. EPA, Fact Sheet on Trichloroethylene (TCE), last updated April 18, 2017, *https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-trichloroethylene-tce#q8*

[4] *Ibid.*

[5] *Ibid.*

[6] *Ibid.*

[7] *Ibid.*

[8] see fn 2, pp 7432-3

[9] *Id.*, p. 7433

[10] U.S. EPA, TSCA Work Plan Chemical Risk Assessment, Trichloroethylene: Degreasing, Spot Cleaning and Arts & Crafts Uses, CASRN: 79-01-6, EPA Document # 740-R1-4002, June 2014, *https://www.epa.gov/sites/production/files/2014-11/documents/tce_opptworkplanchemra_final_062414.pdf*

[11] The number of workers exposed to TCE (in the "Exposure Potential" column) is from the proposed rule rather than the risk assessment because the proposed rule discussed the results of a supplemental analysis in addition to the risk assessment and so evaluated a larger population.

[12] see fn2, p. 7443

[13] *Id.*, pp. 7449-7451

[14] U.S. EPA, Learn about the Toxics Release Inventory, *https://www.epa.gov/toxics-release-inventory-tri-program/learn-about-toxics-release-inventory#What%20is%20the%20Toxics%20Release%20Inventory*;

U.S. EPA, TRI Explorer, "Release Reports," *https://iaspub.epa.gov/triexplorer/tri_release.chemical*

[15] EPA released the first version of the preliminary 2016 dataset on July 19, 2017 and in October 2017, issued the complete 2016 dataset. The preliminary data gives "the public an opportunity to see the most recent TRI information prior to the publication of the TRI National Analysis report in January." U.S. EPA, "TRI Preliminary Dataset," *https://www.epa.gov/toxics-release-inventory-tri-program/2016-tri-preliminary-dataset*. Although we did not send letters to facilities based on this 2016 data, we reviewed the forms that were submitted to determine any increases in TCE emissions from 2015 to 2016 and to find information relevant to vapor degreasing.

[16] The total at the time was 146, but it is currently 147. When we reviewed the TRI database to determine which facilities to mail letters to, Chemline Inc had not yet reported 2015 emissions.

[17] In its proposed rule, EPA provided a list of NAICS codes for industries that potentially use TCE for vapor degreasing or conduct other activities that the rule would cover (e.g. manufacturing TCE). Each facility reporting into TRI specifies which NAICS code best describes its business activities. We used the

list of codes in EPA's rule to sort the 146 facilities (that reported air emissions of greater than 0 pounds) into two "buckets" as indicated by the flow chart above - (a) those that may use TCE for vapor degreasing, because at least one of their codes matched one in EPA's rule, and (b) those not likely to use TCE for vapor degreasing, because none of their NAICS codes were in EPA's rule. This eliminated three facilities from consideration.

[18] We excluded waste processors, chemical manufacturers, chemical distributors, and adhesives manufacturers because their line of business makes it unlikely that they use TCE for vapor degreasing. In addition to facilities meeting the criteria described, we did not grade Chemline Inc because it did not report 2015 TCE emissions through the TRI until May 2017. By that time, we had already completed our review of the TRI database to determine which facilities to mail letters to, so we did not contact that facility. We also did not grade Goodrich Plating Ops, even though its *2015 TCE TRI form* stated that the facility was discontinuing the use of its vapor degreaser, because its *2016 TRI form for lead emissions* revealed that the facility as a whole was shut down and all equipment was being decommissioned.

[19] Although a representative of Boeing's Berkeley, MO facility declined to respond to us, we used information from the facility's *2016 TRI form* to confirm its use of TCE for vapor degreasing and reviewed comments that The Boeing Company submitted to EPA's vapor degreasing rule docket to answer our other questions. Staff at Integer, the parent company of Lake Region Medical and Greatbatch - Globe Tool Inc, confirmed that both facilities used TCE for vapor degreasing and referred us to the company's detailed public comments posted in EPA's vapor degreasing rule docket for further information. Four other facilities that did not respond to our inquiry, *Accurate Forming LLC*, *Dutton-Lainson Co*, *EaglePicher Technologies LLC*, and *FJC Services LLC* submitted TRI forms for 2016 containing information indicating that they currently use or previously used TCE for vapor degreasing. The notes on the 2016 TRI forms for *Alloyweld Inspection Co* and *Summerill Tube Corp* conflicted with what employees told us, and we accepted the information in the TRI forms because it was in writing, Alloyweld's form was certified on the same day as staff's verbal statement to us, and Summerill's form was certified after staff's email to us. Spirit AeroSystems Inc provided general information about risk minimization efforts and mentioned the company uses TCE but did not confirm that it is used specifically for vapor degreasing. Representative of Spirit AeroSystems Inc Wichita, KS facility, Personal communication, June 14, 2017

[20] Information for Chemline Inc is also provided even though we did not grade this facility because it reported 2015 TCE emissions through the TRI in May 2017, after we had completed our review of the TRI database to determine which facilities to mail letters to.

[21] Greatbatch - Globe Tool Inc stated in its *2015* and *2016* TRI forms: "Greatbatch Medical has investigated non-hazardous solvents for its parts cleaning operations and continues to explore new options." This facility's grade is also based on company-wide comments submitted on May 19, 2017 by its parent company, Integer, in the TCE vapor degreasing rule docket.

[22] The grade for the Lake Region Medical facility in Trappe, PA is based on the company-wide comments submitted on May 19, 2017 by its parent company, Integer, in the TCE vapor degreasing rule docket.

[23] The grade for Boeing's Berkeley, MO facility is based on the facility's *2016 TRI form* and the company-wide comments Boeing submitted on May 19, 2017 in the TCE vapor degreasing rule docket.

[24] Although staff at Alloyweld Inspection Co clearly stated that the facility uses TCE for vapor degreasing by phone on June 13, 2017, the *2016 TRI form* certified on the same day said the facility "changed from trichloroethylene to n-proply [*sic*] bromide."

[25] When describing its degreasing process, Steel Coatings Inc staff used the term "mist degreaser." EPA staff considers "mist degreasers" as subject to the proposed vapor degreasing rule, according to a phone call on September 20, 2017.

[26] Although staff at this facility told us by email on June 16, 2017 that they were renewing their search into alternatives to TCE, on their *2016 TRI form*, certified on June 27, 2017, the facility stated: "Pollution prevention previously implemented - additional reduction does not appear technically or economically feasible."

[27] A representative from an additional facility, Hu-Friedy Mfg Co LLC, said informally via phone on June 21, 2017 that they had plans to phase out their use of TCE, and they wanted to wait to provide an official response until after reviewing the letter. This person did not follow up with any additional information, so we gave the facility an "F" for not responding.

[28] Roper Pump Co Commerce, GA facility representative, Telephone interview, June 22, 2017

[29] Blue Cube Operations LLC - Plaquemine Site facility representative, Telephone interviews, August 9 and 15, 2017

[30] *Masters Machine Co 2016 TRI form*

[31] Masters Machine Co representative, Telephone interview, September 18, 2017

[32] Olin Blue Cube Freeport TX representative, Telephone interviews, August 2 and 10, 2017

[33] NN, Inc. representative, Telephone interviews, June 15, 2017 and September 18, 2017

[34] *Alloyweld Inspection Co 2016 TRI form*

[35] *EaglePicher Technologies LLC 2016 TRI form*

[36] Also excluded from these 34 facilities are those that are waste processors, chemical manufacturers, chemical distributors, or adhesives manufacturers, because their line of business makes it unlikely that they use TCE for vapor degreasing.

[37] Head Manufacturing Inc representative, Telephone interview, June 7, 2017; US Ringbinder representative, Telephone interview, June 21, 2017

[38] Head Manufacturing Inc representative, Telephone interview, June 7, 2017

[39] Microporous LLC representative, Telephone interview, July 6, 2017

[40] Comment submitted on May 19, 2017 by Kathleen O'Shei, Director, Environmental, Health, Safety & Security, EHSS Center of Excellence, Integer Holdings Corporation, pp. 3, 6, *https://www.regulations.gov/document?D=EPA-HQ-OPPT-2016-0387-0688*

[41] *Id.*, at pp. 2, 6

[42] *Id.*, at pp. 6, 7

[43] Comment submitted on May 19, 2017 by Steve Shestag, Director, Environment, The Boeing Company, *https://www.regulations.gov/document?D=EPA-HQ-OPPT-2016-0387-0690*

[44] *Id.*, at pp. 1, 2, 4

[45] *Id.*, at p. 2

[46] *Id.*, at p. 3

[47] *Id.*, at pp. 2-3

[48] *Id.*, at p. 3

[49] Rochester Steel Treating Works Inc representative, Telephone interview, June 8, 2017

[50] LS Starrett Co representative, Telephone interview, June 13, 2017

[51] see fn38

[52] see fn40, p. 6

[53] *Ibid.*

[54] *Id.*, p. 7

[55] *Ibid.*

[56] see fn49

[57] *EaglePicher Technologies LLC 2016 TRI form*

[58] *Alloyweld Inspection Co 2016 TRI form*

[59] Diamond Chrome Plating Inc representative, Telephone interview, June 21, 2017; GKN Aerospace NA Inc representative, Telephone interview, June 20, 2017; Limco-Airepair Inc representative, Telephone interview, June 9, 2017

[60] 3P Processing Inc representative, Telephone interview, June 7, 2017

[61] See fn2, p. 7443

[62] AMETEK Specialty Metal Products Div representative, Telephone interview, June 21, 2017

[63] Anoplate Corp representative, Personal communication, June 15, 2017; *http://www.serec-corp.com/about-us.html*

[64] see fn39

[65] This facility used the term "mist degreaser" when describing its degreasing processes. Steel Coatings Inc representative, Personal communication, June 14, 2017. According to EPA, this type of degreaser is subject to the proposed vapor degreasing rule.

[66] U.S. EPA, TRI Basic Data Files: Calendar Years 1987-2016, page last updated November 2, 2017, *https://www.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-2016*

[67] One additional facility, Chemline Inc, reported 2015 and 2016 emissions but did not certify its 2015 TRI form until May 2017, after we had prepared letters to mail to facilities. Chemline Inc reported TCE air emissions of *85 pounds in 2015* and *69 pounds in 2016*. On its 2016 TRI form, the facility stated that TCE "is a key component in one of our raw materials." In addition, fifteen facilities that reported 2015 data did not report for 2016, but since facilities may stop reporting for a variety of reasons, we did not focus on them.

[68] *Electro Chemical Engineering & Manufacturing 2016 TRI form.* The second largest new emitter only released 993 pounds.

[69] *FJC Services LLC 2016 TRI form*

[70] Note that the Olin Blue Cube Freeport Facility reported via EPA's Chemical Data Reporting, for the 2016 period, that the facility manufactured TCE and none of it was used on site.

[71] This table shows increases we considered significant - those both greater than 10 percent and 10 pounds, based on reporting to the Toxics Release Inventory, available from *https://www.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-2016* and *https://iaspub.epa.gov/triexplorer/tri_release.facility*.

[72] Excluded from this group of 34 facilities are waste processors, chemical manufacturers, chemical distributors, or adhesives manufacturers because their line of business makes it unlikely that they use TCE for vapor degreasing.